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The Aeronautical Journal.

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NOTICES OF The Aeronautical Society.

At a meeting of the Council held at the Society of Arts on Monday, April 15th, 1901, the following gentlemen were elected members of the Society:—

Major F. C. TROLLOPE (late Grenadier Guards.)

Mr. L. W. BROADWELL.

The following gentleman was elected a member of the Council:—

Major F. C. TROLLOPE.

Resolved, that Mr. Patrick Y. Alexander's offer to financially assist the Aeronautical Society to the extent of one hundred pounds per annum for five years should be accepted and the warmest thanks of the Council should be conveyed to Mr. Alexander for his most generous gift.

GENERAL MEETING.

The next General Meeting of the Aeronautical Society will take place at the Society of Arts, John Street, Adelphi, on Monday, July 15th, at 8 p.m. Major H. C. Roberts will take the chair.

On this occasion a special series of photographs representing the British War Balloon Operations in South Africa, taken on the spot, will be exhibited by the electric lantern.

The following papers will be read:—

"The Chief Scientific Uses of Kites," by Mr. A. Lawrence Rotch, Director of Blue Hill Observatory, U.S.A.

Notes on:—

1. "Sounding the Air by Flying Machines controlled by Hertzian Waves," illustrated by working models.
2. "The Hofman Flying Machine," illustrated by lantern views.
3. "Rotary Kites."
4. "Behaviour of Screws Rotating in a Horizontal Plane when exposed to Currents of Air," by Mr. Patrick Y. Alexander.

"Balloon Photography at Great Altitudes," by Mr. Percival Spencer, illustrated by photographs taken from balloons.

Members are reminded that they have the privilege of introducing two friends to the general meetings of the Society.

Members and correspondents of the Aeronautical Society are reminded that the present address of the Aeronautical Society is 19, Campden House Road, Kensington, London, W., and that all communications should be addressed to the Honorary Secretary to that address.

ERIC STUART BRUCE,

Honorary Secretary.

GENERAL MEETING.

A General Meeting of the Aeronautical Society of Great Britain was held at the Society of Arts on Monday, April 15th, 1901. Major H. C. Roberts occupied the chair.

The CHAIRMAN: Ladies and Gentlemen—We commence our proceedings this evening by asking our Honorary Secretary, Mr. Eric Stuart Bruce, to be good enough to read to us the minutes and proceedings that have taken place in connection with the Society since we last met here.

The SECRETARY read the minutes, &c., including the address of condolence to the King and His Majesty's reply, published in the AERONAUTICAL JOURNAL, April, 1901.

The CHAIRMAN: As you are already aware, Mons. Wilfred de Fonvielle, Ex-Annual President of La Société Française de Navigation Aérienne, and who has distinguished himself very much in aeronautical science, has been good enough to come over especially from Paris to address the members of the Aeronautical Society of Great Britain on "Aeronautics in France," when he will describe the progress made since his escape in a balloon from Paris during the siege of 1870, and he will also discuss the actual prospects of aerial navigation.

"Aeronautics in France."

BY WILFRED DE FONVIELLE.

Mr. Chairman, Ladies, and Gentlemen,—Although feeling desirous not to tax your patience this evening, it is my duty to apologize for addressing so influential an audience in the English language instead of my native French. If I am doing so it is not owing to any forgetfulness of my lack of the many qualifications which distinguish the English debater, especially as it is so long since I visited your prosperous shores; but I was told by my friend, Mr. Eric S. Bruce, your Honorary Secretary, whose wishes are binding to me, that I could not offer a more welcome compliment to a British Society than in using the British tongue this evening. The air being the freest of all elements, is not the tongue of the freest of all nations the most fit for the discussion of aerial matters?

I must begin by acknowledging the great honour passed upon me by your Society in electing me as a honorary member of an Institution which ranks so high in public estimation and which includes so many illustrious names on its list of members. I will also offer you my best thanks on behalf of my friend, M. Jaques Faure, with whom I have been associated on the present occasion. If my countryman could have been present, which was an impossibility, as he left France a month ago for China, I am sure he would have considered that the honour bestowed upon us is a compliment to our common motherland. For my own part, I will try to show my gratitude by giving you some useful information relating to the progress of aeronautics in France.

But though, in the present address, I shall strictly confine myself to the principal aeronautical questions at present discussed in France, on my return to Paris I shall be glad to communicate by letter with any one of your members interested in any special branch of the subject of aeronautics.

At the last Aeronautical Congress held in Paris, when Major F. C. Trollope represented the British Government, Monsieur Janssen, the President of the Congress, set forth a great idea, which was endorsed by all the aeronauts assembled under his chairmanship. He said, on this great occasion, that the conquest of the air is not destined to promote the ends of any nation in particular, but to develop at large the welfare and enlightenment of mankind. This truly philosophical view is splendidly supported by aerial facts. It is true that the rather keen interest felt by the general public for the progress of aerial navigation can be almost exclusively attributed to the glorious service rendered by ballooning to France, when, 30 years ago, she was forsaken by the God of War. But it can be asserted that essential progress in aeronautics has been also produced by many efforts not having any warlike tendency.

The first balloons sent up in Paris 117 years ago before admiring crowds were hailed as opening magic ways for travelling at any distance with the velocity of the wind. They

were the swiftest means of travelling then known; for at that time there were neither railways nor steamers nor automobiles. Then it was supposed that this new way of communication could be used, either by selecting in the atmosphere a stream of air convenient to the purpose, or by forcing one's way toward a determined point by paddle, rudder, or even sails.

But it was soon discovered that very often the aerial ocean is moving in a single direction, and at all events, that it is not possible to know beforehand where the wind will carry the balloons after they have reached a determined altitude.

Besides, the mechanical efforts tried with hand-power proved feeble and were sometimes attended with tragedy, several experimenters being burnt to death, drowned, and killed by being precipitated from the car. Then the public lost interest in aerial experiments, expressing for them nothing more than the curiosity felt in witnessing a prize fight or the performance of tight-rope dancers or fire-eaters.

It cannot be said that aeronauts were rescued from the miserable position of being ranked amongst mountebanks by Science only, even using that term in the broadest acceptation, and making it synonomous with Philosophy, Poetry, and Art.

In the air there is nothing to trade for or search after except grand ideas and magnificent conceptions relating to the harmony of Nature and the reverence for Divine Providence.

The air contains no untold treasures to be discovered by the microscope or caught by delicate nets. The only treasure to be found there by scientists is perhaps some cubic inches of a rare gas, such as helium, and this is of no marketable value except for the spectroscopist who could not possibly pay for it a large sum of money.

I think that the great helper of Science in conquering the air is unquestionably athletics. Is it not likely that aeronautical sports will become popular in this great country of sports, which is visited by all the sportsmen of the world in order to be instructed in sporting matters—rowing, sailing, yachting, horse racing, polo, golf, cricket, and other similar amusements.

But am I not making a great mistake in determining a time when aeronautical sports will become popular in this country? Have they not already been popular for a long time?

I could not undertake to mention all the celebrities who have crossed the British Channel in a balloon since the voyage of Blanchard, but I will make mention of the performances of your good old Green, of General Brine, Sir Robert Couroney, and Powell, the plucky member of the House of Commons, who found a watery grave. Nor can I forget the brave Colonel Burnaby, with whom I once had the pleasure of ascending from the Crystal Palace, and who so soon after this happy and joyful balloon trip gallantly shed his blood for his Queen and Country in the Soudan.

Up to the present hour I have only once had the honour of seeing the Reigning Majesty of England. It was in 1898, when the great Giffard balloon was ascending in La Cour des Tuileries. The then Prince of Wales arrived with his suite; they ascended at once, His Royal Highness was wafted up into cloud-land by Gaston Tissandier. I ordered the band to play "Rule Britannia" when the party landed, and afterwards "God Save the Queen." The Prince appeared to enjoy the trip, and expressed his satisfaction in such terms that one cannot help hoping that King Edward the Seventh will prove a royal patron of aeronautics in your land where captive balloons made their appearance in 1869, but, I am sorry to state, with very little success. The gross amount collected by the Giffard captive balloon ascents amounted to no more than £200, a very poor income indeed for covering expenses surpassing £20,000. But the prestige of royalty is so great in this land that this trip produced a revolution in the English opinion. Just after the royal visit of 1898, Giffard could have covered all his expenses at once if he had been willing; the story is rather amusing, and it is a nice illustration of the character of the celebrated engineer. On the following day, just when the royal visit was reported by the London papers, a gentleman applied to Giffard as immediate purchaser of the balloon, proposing to take possession of it only at the close of the exhibition. He offered to pay £30,000 in cash, and at my suggestion Giffard accepted. But on the morrow when the would-be purchaser returned to Giffard's home in order to draw up the deed of agreement, Giffard asked what his idea was in purchasing the balloon, to which he replied that he had arranged for ascents to be made from the Crystal Palace grounds. On hearing this, Giffard said: "Very well, I have no objection to it if no one is allowed to step into the car, and the balloon is to go up, not with passengers, but merely with ballast." As soon as the gentleman

heard the extraordinary condition put on the bargain, he took up his hat and angrily left the room. When we were alone, I asked Giffard why he had lost the opportunity of cashing so large a sum of money. He did not try to explain, but gave a trivial reason. I suppose that really he was afraid of the grave responsibility which he would have had as the constructor of the balloon. If such was the case, Giffard was quite right, as in 1899 the balloon could not continue its ascents up to its allotted time, the canvas having been burnt with sulphuric acid. The balloon, when at anchorage, was torn to pieces by the wind.

I am of the opinion that one can fitly compare aeronautics to an immense bird which is supported in the air by its two wings, one of its wings being science, the other sport. By using both wings with discretion, wisdom, and daring, this immense bird can make conquest of the air. It is not, therefore, a matter for wonder that in France we have established two different Societies, each of which is devoted specially to one of these two wings. These two Societies are living in friendly intercourse together. They can be said to be working hand in hand for the same end; as even the days of meeting are so arranged that it is possible to be present at both. Our actual President of the Societe Francaise de Navigation Aerienne is the Prince Roland Bonaparte, who is also the President of the Scientific Committee of the other Society. The Societe Francaise de Navigation Aerienne was organised shortly after the Franco-Prussian War as soon as peace and order were restored on the territory of the French Republic. It was established by Paul Bert, Herve, Mangon, and other friends of Gambetta who were members of his short-lived Grand Ministry. In the Chair there have been successively a large number of illustrious academicians, and politicians such as Berthelot Janssen, Eugene Spuller, the Minister of Public Instruction. The Secretary of State is ex officio the patron of this Institution, which, within a very few days, will be declared an establishment of public interest for France.

One of our members, Eugene Farcot, an engineer and a siege aeronaut, bequeathed us a sum of £4,000, which is to be spent in the directing of balloons; a part of this sum will probably be used this present year. We intend to celebrate our coming of age by some appropriate festivities. We hope that the Aeronautical Society of Great Britain will send a delegation on that occasion.

The younger Society is the Aero-Club, which has been in existence only for a few years; but, as Corneille says in the tragedy of the "Cid":

"Chez les ames bien nées,
La valeur n'attend pro le nombre des années."

So this Society has already acquired a well-earned world-wide fame.

I shall have the honour to present your Association with the yearly book of the Aero-Club. This volume shows that the interest in ballooning is fairly developing amongst the upper classes of France. The time is fast approaching when every leader of high life in France will think it his duty to spend some time in the higher regions of the atmosphere. At all events the revival of aeronautics on the French side of the Channel must be considered as being a corollary of the surprising success of automobolism. Indeed, the Automobile Club itself has most powerfully furthered the development of the Aero-Club. The members of the Aero-Club are permitted to use for our dinners, meetings, and lectures the magnificent rooms of the splendid hotel which the Automobile Club purchased in the Place de la Concorde. I will deem it a great honour if, at our next monthly dinner, I may introduce some of you to our table, where you will find a truly French hospitality and welcome. But to return to aeronautics, is it not natural that the astounding performances realized on land by the petroleum machine should have made men ambitious to try this wonderful apparatus in the air, and to give wings to the auto-velos, wings that were wanting in order to give full reason to Plato, when he says that "Man is a featherless bird."

The Aero-Club is very prosperous, as can be proved by the following statistics: In the year 1900, the receipts amounted to about £2,450 and the expenses to £1,200, leaving an increase of £1,250. In that year 144 ascents were made, consuming more than 6,000,000 cubic feet of gas. Four hundred people were carried up in the air, the total duration of all these trips being 1,200 hours, which gives for each balloon a mean duration of 8 hours and 20 minutes. The average length of each course was the unprecedented number of 400 k.m.s., and there were almost always three people in the car. Some of these Aero-Clubbists have already won a name in the history of science. I may mention here Comte Henri de la Vaux and Comte Castillon de St. Victor, who covered a distance of 1,925 k.m.s.; and Jacques Balsan, who reached an altitude of 8,000 metres. If these numbers are compared with those of 1899, we find that

the amount of gas spent in 1900 is four times greater, that the total length of the distance run over is three times larger, that the total duration of the trips is four times longer, that the number of passengers is three times more considerable, and that the record of the distance run without landing is one thousand nine hundred and twenty-five, against one thousand three hundred and thirty-six, the mean duration of each trip being 35 hours 45 minutes.

It is true that some historical scientific balloon ascents were executed in Paris by Biot and Guy Lussac in 1801; but, nevertheless, Professor Bryan was justified in his address delivered recently before the Royal Institution, in stating that the balloon had been engaged in the service of Science by the British Association. It was this great Society, which put into execution the schemes which had been thought out by Arago in 1843, and it was your distinguished countryman, Mr. Glaisher, who executed the first series of scientific observations executed with a definite purpose by means of instruments which had been specially constructed, and who discovered the first general laws of the Meteorological Phenomena of the Great Atmosphere. Mr. Glaisher secured his observations in the car of his balloon with the same care, precision and correctness as if he had been seated in the Meteorological department of Greenwich Observatory. His work was popularised throughout the whole of Europe and America by "Travels in the Air," which was originally published in English and French, and was translated into the Swedish, German, and Russian languages.

One of the first steps taken by the Societe Francaise, was to organise a series of scientific ascents which would rival those of Mr. Glaisher. In 1875, a magnificent balloon bearing the name of "Zenith," was constructed, funds being raised by subscription, and also by the Government. The beginning of the enterprise was attended by success, and the Zenith made some notable ascents. But, unfortunately, the aeronauts relied too much on a new means of inhaling pure oxygen for compensating the rarity of the gas contained in each dose of air introduced into the lungs; and on one occasion, when the Zenith was navigating an upper level of the air, two of the travellers were found to be dead. The cause of this catastrophe had for years been considered a mystery, but recently it has been explained by some incidents connected with the balloon races held in Paris on the occasion of the last exhibition.

One of the competitions was for altitude reached, and the prize was taken by two aeronauts, M. Balsan and M. Louis Godard, who had procured a bag of oxygen and used it in the upper part of the trip. The process which proved fatal in the Zenith catastrophe had become usual in Germany and in England as exemplified by the successful ascent to more than 8,000 metres by M. Arthur Berson and Mr. Percival Spencer.

On the occasion of the balloon race for altitude, M. Louis Godard had placed in his mouth the pipe of the oxygen bag when he reached the moderate altitude of 4,000 metres; but M. Balsan refused, saying, "It will be time enough to begin the inhalation when I commence to feel uneasy. Then M. Godard continued the throwing of the ballast, and soon the aeronauts reached the really dangerous level. But then Godard saw that his friend was turning pale and fainting. He had been taken by surprise, and could not find the presence of mind required for putting the pipe in his mouth. Then M. Godard rushed at him and placed the pipe in his mouth, employing considerable force in introducing it into his lips. M. Balsan soon recovered, the first dose of pure oxygen having produced the known effect, and he was quite right. But this took a little time, and during the interval, M. Godard had not used the inhaling pipe, so he turned pale and fainted and would have been lost if M. Balsan had not rendered him the very service he had received from him. These incidents cannot be disregarded in the history of the Zenith Catastrophe. The aeronauts should have commenced to inhale the oxygen at the first feelings of inconvenience, and have not waited until it became impossible for them to make use of the process.

In consequence of the Zenith catastrophe, a member of the Societe Francaise started a scheme for building a glass cage wherein the aeronauts should be located so as to be preserved against the mortal effects of the rarity of the air. This proposal was submitted to close investigation by a special committee, but it was found after careful calculation that the cage was too heavy for being carried at such a distance from the earth; as, for instance, Mr. Glaisher reached, so the proposal was rejected. Last year another member made a new proposal to devise a diving suit or aerial scaphande. The scheme has been received with favour, and it is now under examination; but it is doubtful if one could ever get rid of several disqualifications.

The Zenith catastrophe was a black spot in

the history of the Societe Francaise. It collected funds for erecting a monument to the memory of the illfated aeronauts and for giving compensation to their families.

The Zenith balloon itself was sent to the Conservatory of Arts as a relic. This starting of a scheme for collecting aerial observation with ballons-montes, was transferred to Berlin, where a splendid series of 75 ascents have been executed, and their results published in three quarto volumes, edited at the expense of the Emperor of Germany. Many scientific ascents were made in France, but in regular series to be compared with those of Mr. Glaisher.

The French, however, discovered new means of exploring the atmosphere. MM. Hermite and Besancon first conceived the idea of sending up ballon-sondes, which means balloons carrying up self-registering apparatus. These experiments have been carried out with a great success; so great, indeed, that an international commission was started for controlling the sending up of ballon-sondes from different parts of Europe. In these international ascents the five leading Powers of Europe are represented: Austria, France, Germany, Russia and Great Britain, the latter being represented by Mr. Patrick Alexander, one of your keenest members for the progress of aeronautics.

This Association is very prosperous, the ascents of the balloons are taking place once a month, and the number of them is increasing. On the last sending up on the 7th March last, not less than 12 were sent up, and of these 12 only one had not been recovered a few days after the ascents.

A great improvement on the original scheme has been realised by M. Teiserenc de Bort, the Director of the Trappes Observatory. Instead of using silk balloons of 300 to 400 cubic metres as Messrs. Hermite and Besancon did, he is sending up paper balloons of 60 cubic metres, which are a miracle of lightness. In filling them even with ordinary coal gas he sends up his registering apparatus to the height of 101,000 metres or more. But, for the success of the operation, it is necessary not to expose these frail and light fabrics to the tearing power of the winds. Consequently, M. Teiserenc de Bort invented a shade which can be pivoted so that the opening is always opposed to the wind, so that the starting is always safe under any circumstance. It is too soon to review the various results obtained through this method, which is to develop gradually all round the world, and to last, certainly, longer than the present century. But it may be said to be to the credit of your great countryman that, despairing to wrest a higher level record than that secured by M. Glaisher, the French aeronauts resolved to build another Glaisher in steel, and in glass, and in copper, who can, without danger of suffocation near the frontier of the pure ethereal medium, report every one of his observations by curves traced by an unfailing hand.

The International Committee, against my own opinion, are arranging for sending up with the ballons-sondes a certain number of ballons-montes, in order to control their observations at lower levels. It is, however, in my opinion, almost useless to employ eye observations for controlling mechanical records. There are strict limits to the susceptibility of the human eye and quickness of impression, even of a Glaisher; but there is none to the velocity and delicacy of a registering apparatus, especially when photography is employed, as is possible in many cases.

Though I speak thus, I am not an adversary but an advocate of the sending up of ballons-montes under some circumstances. There are so many fascinating phenomena to be observed in balloon excursions, that it is to be regretted that so many occasions are lost for inspecting the celestial bodies, because observers confine their exertions to the reading of barometers, thermometers, and hygrometers, which can be done as easily by proper mechanism.

A great path has been opened out through the initiative taken up by M. Janssen, the illustrious director of the Meudon Observatory. In 1889, he sent observers for the first time to look after the November displays of the falling stars; and this step was only the beginning of the forthcoming numerous applications of the balloon to astronomical purposes. It is to be deeply regretted that the occasion of the hour was lost, and that the Persean Star was left without anyone making a balloon ascent to witness the variations of its light when clouds obscured its view from observers on the earth. For this indifference and neglect, the astronomers of the present time will have to bear the reproach of posterity.

After the delivery of this address, M. De Fonvielle exhibited to the meeting a large collection of excellent photographic lantern slides, descriptive of the progress of aeronautics in France; and amongst the most striking were a series descriptive of self-recording apparatus connected with the ballon-sondes, and a fine series of views representing the Vincennes competitions. He also ex-

hibited cinematograph pictures of M. Santos Dumont's navigable balloon, which were received with much applause. The exhibition of the cinematograph films which had been lent by M. Santos Dumont, was rendered possible by the kindness of Mr. Paul, who generously placed, at the disposal of the Aeronautical Society his excellent cinematograph apparatus, and personally attended to its manipulation.

The CHAIRMAN: Ladies and Gentlemen, I think you will agree with me that we have to return our very cordial thanks to Mons. Wilfred de Fonvielle for the trouble he has taken in coming over from Paris to address us, and I ought to mention that by an unfortunate accident he lost the paper which he intended to read to us this evening, and the consequence is that he has been employing himself for many hours to-day in endeavouring to reproduce it. We all know the difficulty that he would be in under any circumstances, but for a gentleman who is addressing us in a foreign language it must be indeed very trying. I ask you, therefore, to pass the following resolution: "That the cordial thanks of this meeting be offered to Mons. Wilfred de Fonvielle for his very interesting paper on 'Aeronautics in France,' and for the view of the photographs and the cinematographs which he has been kind enough to exhibit to us."

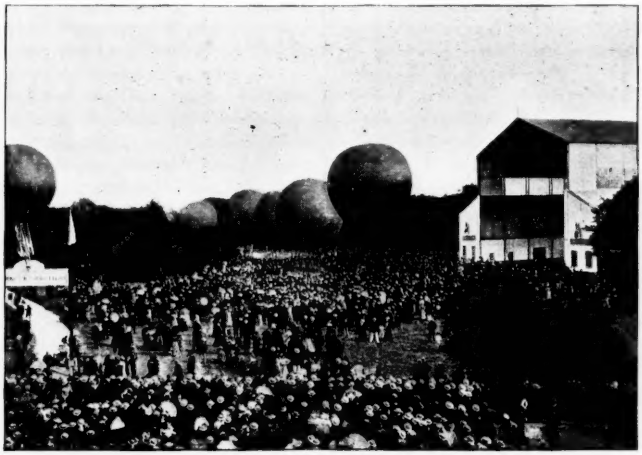
The resolution was adopted with acclamation.

The CHAIRMAN: Mr. Charles Groombridge, a member of the Aeronautical Society, had intended to exhibit his new propeller, but unfortunately an accident has happened and he will not be able to do so; I will, therefore, ask Mr. Bruce to be good enough to show his meteoparachute, a new instrument for investigating the upper atmosphere.

THE METEO-PARACHUTE.

BY E. S. BRUCE.

Mr. BRUCE: This apparatus called the meteoparachute, is very simple in form, but I think it will add considerably to the practical use of the ballon-sonde of which Mons. de Fonvielle has told us so much that is interesting this evening. As you will have understood, the ballon-sonde at the present time is sent away with the recording instrument. These recording instruments are very expensive, and it is a chance as to whether they are ever recovered. As a matter of fact, one sent up very lately fell into the sea, but I believe I am right in stating that the apparatus was rescued. The meteoparachute is a device by which at any moment we choose to fix beforehand, we can bring down to the earth the recording instrument. If, for instance, we want it in ten minutes, or half



The Vincennes Balloon Competition—Preparing for the Race.

an hour, or an hour, we can set this clockwork arrangement so that it will release the meteo-parachute at the given time and it will bring down the recording instruments in a gentle manner so that they will not be broken. For this we depend upon the principle of the parachute, a principle which has been very much neglected and which simply depends upon the resistance of the air. I am now going to haul the apparatus up to the top of the room together with the model parachute and thermometer attached, and you will see when we set it to a certain time, the parachute with its freight will descend at the given moment. This, of course, is the apparatus in a rough form. We have a more special arrangement when we send it up with the balloon. (Experiment.)

Mr. BRUCE afterwards exhibited, in action, a model of a navigable balloon, which illustrated how balloons could be steered in a calm atmosphere. The experiment was received with much applause. He also showed on the screen a series of photographs illustrating the trial trips of Count Zeppelin's airship.

The CHAIRMAN: This ends our programme, ladies and gentlemen, and we thank you for your attendance here and for the way in which you have shown your appreciation of the exhibits.

Sir HIRAM MAXIM: Ladies and Gentlemen, I beg to move a vote of thanks to our Chairman for the able manner in which he has conducted the business of the evening.

Mr. E. P. FROST: I have much pleasure in seconding that.

The CHAIRMAN having acknowledged the vote of thanks, the proceedings terminated.

Echoes of the Siege of Paris.

In reference to M. Wilfred de Fonvielle's recent visit to England to address the Aeronautical Society, the "Daily News" published the following interesting article which is reprinted below by kind permission of the editor of the "Daily News."

M. Wilfred de Fonvielle, who last night addressed the Aeronautical Society, in the Hall of the Society of Arts, is a man with a past, of which, however, he need feel no shame. Not only is he ex-President of La Societe Francaise de Navigation Aerienne, but he was one of the first entrusted during the siege of Paris with the organization of the balloon service from the capital to the provinces. In previous years he and MM. Flammarion, Eugene Godard, and G. Tissandier had seen with apprehension the neglect of ballooning by the French Government. They did what private people could to fill the void, but still they lamented. Since 1794 the country of Montgolfier, the land claiming to be the birthplace of aerial navigation, had not possessed an Aerostatic School. Quelle honte! When the war with Germany broke out, M. de Fonvielle and M. Tissandier offered to accompany the army of the Rhine with captive balloons. They were not even answered. As the latter gentleman drily remarked, "General Lebœuf was determined to depend on his own genius. He would not have known what to do with balloons." The Government of the 4th September showed a different spirit. On the 20th of that month the Paris Post Office could no longer communicate with the outer world, and three days later the first balloon of the new service went up from the capital. M. de Fonvielle made the thirtieth ascent, with four companions. He had meant to use the captive balloon of the Exhibition of 1867, but was luckily disappointed. It split when filled, the silk having no doubt rotted. Hauled to the ground that the rent might be mended, the great gas-filled bag escaped from both net and car, rose into the air, and fell between the French and German lines, where it became a captive in earnest. Had M. de Fonvielle gone up with it, he might not have lived to speak last night. The loss caused him to use L'Egalite, with a capacity of 3,000 cubic metres, or nearly 4,000 cubic yards. Filled at the Vaugirard Gas Works, L'Egalite ascended at ten in the morning of the 24th November, and in four hours and a quarter touched ground at Louvain, Belgium, a remarkably rapid and successful passage. M. de Fonvielle did not return to Paris while the siege lasted. The Germans would not let him. But the service he had helped to form continued triumphantly. Sixty-four balloons left la ville lumiere, the last ascending on the 28th January, 1871. They took in addition to the aeronauts, 91 human passengers, 363 carrier pigeons, and 3,000,000 letters, weighing about 22,000 lbs. Of the 64, five were captured and two lost at sea, with their passengers. It is a record of which the men responsible might well be proud, especially as the aeronauts were chiefly sailors, the number of experts being insufficient. The Germans did their best to hinder the balloon service. They watched constantly for the air-ships. When-

ever they saw one they telegraphed to their posts in the direction it was taking. Krupp made a special gun to fire at balloons, and more than once the enemy found them within rifle range. A large share of this kind of excitement fell to Gambetta. With his secretary, Spuller, and the aeronaut, J. Trichet, he left Paris on the 7th October, 1870, making the fifth ascent during the siege. The balloon lacked lifting power. Crossing the German lines near St. Denis, it was only 1,900 feet above ground. Cannon balls and rifle bullets sang unpleasantly close to the travellers. They threw ballast overboard, and escaped, but shortly afterwards mismanagement brought the balloon rapidly to earth not far from a German post. Out went more ballast, and once again the hope of France rose superior to misfortune. Passing near Creil at a height of only 650 feet, his balloon was seen by soldiers of Wurtumberg. They ran to their rifles, which, luckily, were stacked. Gambetta and his companions spied the danger. Sacrificing more ballast, they mounted to a height of 2,500 feet, followed by a fusillade which did some trifling damage, one of the Dictator's hands being grazed by a bullet. A third time they were fired at. It was near Montdidier, and under circumstances which seemed to suggest that the Germans were bad shots. The balloon had sunk nearly to the ground, and could not be raised, for the precious ballast had all gone. A party of the enemy, camped on the outskirts of a wood, made a target of it, but in vain. Passing over the wood, the balloon was caught by the upper branches of an oak, and Gambetta's aerial voyage came to an end. With the help of some peasants he alighted, and reached Montdidier, whence he went to Amiens to pass the night.

Notable British Balloon Ascents.

By Percival Spencer.

After a series of balloon ascents extending over many years, I may truly say that each new ascent made differs in some manner from previous ones, and new interest and new experiences always await the aerial voyager. It was in 1898 that I had the pleasure of accompanying Mr. George Griffith on a balloon trip from the Crystal Palace to France. On the 3rd of February we made our first attempt, the day was dull and the balloon was rapidly wafted over Chatham and Canterbury; all was drear and gloomy, and though the course of the wind was such that we could have speedily crossed, we could not hope to obtain photographic records of the voyage; and, therefore, landed in England, and made another attempt on the 8th of the same month. On this occasion a bright sky and a brisk breeze gave promise of a fine trip, and so it proved. At heights varying from double that of Snowdon to but a few hundred feet we continued our course over land and sea to Verchin, in the Pas de Calais, my companion's record of which was set forth in print in "Pearson's Magazine" illustrated with blocks made from the photos we secured. We travelled at thirty miles an hour, and easily landed in four hours after our start.

Balloon ascents for the instruction and entertainment of visitors have for many years formed a feature of the programme of the Annual Gala and Flower Show held at York, no less than six ascents being made during the three days of the Show. Parties of passengers are made up for each balloon, and some delightful trips over the Yorkshire wolds result. I have secured some of my finest balloon photographs in the clear air of York; that of the City, Minster, and Old Wall having been already published in this journal.

Whilst these right-away balloon ascents from the most pleasant and undoubtedly the practically best form of ballooning, the captive balloon has come more to the front for use by naval and military folk. Seated in the car of a balloon held captive by a steel or hemp cable the soldier can spy out the country for miles round, and it is only necessary to mention the eulogistic dispatches from the generals in the recent South African military operations, to show the value in which the balloons were held. For naval purposes, the sailor's range of vision can be vastly extended. The horizon no longer need remain but a few miles away. At 1,000 feet thousands of square miles are within range of vision. Whilst the naval authorities have not yet adopted balloons, it is worthy of record, that Lieutenant H. O. Arnold-Forster and other officers of H.M.S. "Vernon" conducted experiments with a suitable balloon at Portsmouth last year. They made the hydrogen gas, inflated the balloon, and succeeded in obtaining bird's-eye views of the whole of the harbour and fortifications.

At the British Association meetings, for the last three years, I have made ascents with

the Rev. J. M. Bacon, whose experiments in mid-air have revived the scientific interest in the subject. Not only the records of dust-counters, hygrometers, and air samplers has Mr. Bacon obtained, but he has also, either at Bristol, Dover, Bradford or Newbury, carried on experiments with aerial bombs, wireless telegraphy, and collapsing drum signals. The bombs consist of a cartridge of guncotton which is suspended some hundred feet beneath the car, and ignited by pressing the button of an electric battery in the car. A terrible explosion results, the balloon and air are shaken with its force, and loose portions of twine, paper, etc., which may have accumulated on the balloon are loosened and flutter down to the car, but the noise does not hurt. After a lapse of about a quarter of a minute, the exact length of time is carefully noted, the echo returns from the earth, and reverberations continue for some time. Echoes from the earth, and from clouds seen and unseen, are the object of the observations. The wireless telegraphy experiments such as were carried out from Bradford to Sheffield, on the 10th September last, consist of taking in the car some three hundred pounds weight of telegraphic instruments, and hanging a pendent wire from the balloon. A wire also runs up a lengthy pole fixed in the grounds at the point of start, and by this means communication is maintained between the earth and the balloon as it floats away into the distance. These experiments were a pronounced success, and as such, warrant further investigation. The collapsing drum signals are a means of communicating to the earth from the balloon as the country is passed over. The drum, when open, is a conspicuous object as it hangs from the balloon, and is easily shut and opened from the car by a string. Anyone understanding the Morse Code can read the messages. Whilst passing over the camps on Salisbury Plain on August 29th last, messages were flashed up to the balloon by heliograph, and replies sent.

On two occasions last season I was aloft in terrible weather, when storm clouds were around, and when lightning flashed everywhere. The ascent from Newbury with Admiral Sir Edmund Freemantle and Mr. Bacon and his son has been graphically described as in "the heart of a thunderstorm." The morning had been fine, but at the hour of the ascent clouds closed in. A considerable wait was made, during which there had been rain, thunder, and lightning. In a lull as it were, hoping that the storm had passed we ascended; but no sooner had we left the earth than a fine specimen of lightning-flash passed through the air ahead, reaching from the black cloud above to the dark earth beneath us. Then started hail, rain, lightning and thunder all around, and after passing Hungerford and Savernake Forest we decided to get down out of it, and landed at Marlboro'. The following week—it was at Ilkeston, in Derbyshire, on August Bank Holiday last—I had another similar experience, which has not been reported. In company with a local gentleman I went up in the calm before a storm. We soon were in the midst of such a scene as I have described above. The storm clouds were all around ever and anon bursting into lightning flashes. In half an hour we had travelled to Mansfield, and descended. Before the balloon had been emptied, the storm was upon us, such a storm too. Within a quarter of an hour of the start, tents were being wrecked in the grounds from which we had started, and all the fury of the storm had burst upon them. The balloon ran before it, and as I have explained, had descended and was about empty before it overtook us. These ascents raise a most important question for meteorologists and balloonists, namely, if a free balloon forms an attraction for lightning or not. The question has been asked, but I have not yet seen a satisfactory answer.

Of balloon trips of interest, I think my Cross-Channel ones most worthy of mention. On four occasions recently has the silver streak been crossed. Of the first I have already made mention. On the second occasion, accompanied by Mr. Lawrence Swinburn, I crossed on the 20th December—almost the shortest day in the year, but, nevertheless, one which proved bright and fine. On this occasion we were testing sails and dragropes over the water, and succeeded in diverting the course of the balloon from that of the wind to an appreciable degree. London to Havre in four hours was the record of that voyage. Again, on the 29th July, on the occasion of a Crystal Palace Fete Day, Mr. C. F. Pollock and I, in the Crystal Palace Balloon of 36,000 cubic feet capacity, sailed for five and a half hours, over Tunbridge Wells, Hastings, and the sea, until France was reached. Not, however, before all ballast, bags, cloths, and even the grapnel had been thrown overboard to keep the balloon aloft. The Frena Camera, however, with its faithful records, was kept intact. On the 15th September, Mr. P. Y. Alexander and I had a speedy trip from Dover to Gravelines by

balloon, carrying a message from the British Association in England to Scientific Confreres in France. The "Sketch" contained an account with photographs I secured.

It is unnecessary to more than mention the numerous balloon ascents, parachute descents, ascents of the monster Fish Balloon, shaped and decorated according to nature, made by myself and brothers, throughout the length and breadth of the country. But perhaps I should not close this paper without referring to the new aeronautical premises now erected by Messrs. C. G. Spencer and Sons at Highbury Grove. Here is the only specially-designed establishment for the purpose in this country—including a hall with curved roof sufficiently large for the inflation with air of the large-sized balloons, in order that they may be examined, repaired, or dried. From this establishment the present season witnessed the advent of eight fully-equipped passenger balloons with aeronauts and assistants on one day. Four of these were to make simultaneous ascents in London on the 1st May on behalf of the "Sun" newspaper, and duly ascended with observers in the car of each balloon from West Ham, Barnes, the Welsh Harp, and the Crystal Palace; whilst the other four balloons, used for the purposes of advertisement, left for South Wales, where they also satisfactorily started ascents with parties in the car of each on the 1st May, in Cardiff, Swansea, Newport, and Pontypridd. Thus it will be seen that there are ample facilities for the future of balloon investigation in this country, and with the ever increasing interest in the subject, no doubt each year of the new century will be able to chronicle further progress.

PERCIVAL SPENCER.

Angle of Incidence.

BY WILBUR WRIGHT.

If the term "angle of incidence," so frequently used in aeronautical discussions, could be confined to a single definite meaning, viz., the angle at which aeroplane and wind actually meet, much error and confusion would be averted. But many of the best writers use this term loosely and inexactly, with the result that their calculations and explanations of phenomena are thereby often rendered of little value, and students are misled.

If a plane be held stationary in a horizontal wind (Fig. 1), the angle of incidence A C D will be equal to the angle with the horizon. But if the wind have an upward trend, the angle of incidence will be increased to A C D^2. A calculation based on the assumption that A C D still remained the true angle would, of course, be seriously in error.

If it be assumed (Fig. 2) that the wind moves from D^2 to C, while the plane moves from E to C, the angle of incidence will become A C D^3. The wind having an apparent horizontal speed of F C+E C, which is equal to F^2 C, as compared with a vertical speed of D^2 F, the wind will appear to strike the plane from the direction D^3 C, thus making its angle of incidence A C D^3 instead of A C D^2.

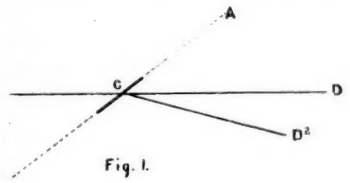


Fig. 1.

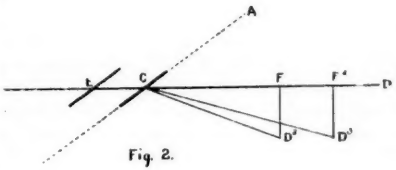


Fig. 2.

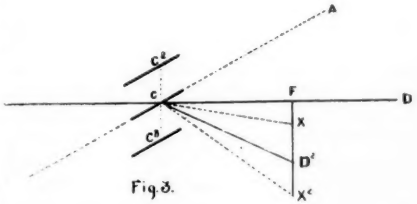


Fig. 3.

Taking still another case (Fig. 3), in which the wind moves from D^2 to C, while the plane is rising from C to C^2 the angle of incidence will be A C X. The horizontal speed of the wind will be F C, and its apparent vertical speed D^2 F−C C^2 = X F, so that the wind will appear to strike the plane from the direction X C. If the plane had fallen from C to C^3 the angle of incidence would have been A C X^2, since the vertical motion would now have been D^2 F+C C^3 = X^2 F.

A study of the foregoing will lead to the conclusion that in order to obtain the angle of incidence, it is first necessary to know correctly (1) the angle of the plane with the horizon; (2) the horizontal speed of the wind; (3) the vertical speed of the wind; (4) the horizontal speed of the plane; (5) the vertical speed of the plane. Now, since the probability of obtaining five correct simultaneous measurements is very slight when the observation is taken in the open air, and since the soaring angle is not supposed to exceed three degrees, it is evident that calculations based upon observations of soaring birds are of exceedingly doubtful value.

But though direct attempts to calculate the angle of incidence promise little for accuracy, another method remains by which approximately correct results may be obtained. The tables of Langley, Lilienthal, Chanute, and others give with a good degree of accuracy, the vertical component of the normal pressure at all angles and speeds, both for planes and curved surfaces. Now, since the elements of these tables are four, viz., area, speed, angle, and lift, it follows that three factors being known the fourth may readily be obtained. The angle of incidence may be calculated in any case where speed, lift, and area are commensurable. Of these, area may be obtained by actual measurement. Lift is equal to weight supported, and can also be exactly measured. Speed alone requires to be calculated at the instant the observation is made. Thus the opportunity for error is reduced to a single item, and this the one which affects the result least seriously in case of a slight error. It is easier to measure speeds than angles, and errors are less costly. There is, of course, a possibility of error in the tables, but the results have been confirmed by the experiments of independent observers, and are believed to be substantially correct. Calculations of the angle of incidence based upon this plan would scarcely be so seriously in error as that of a well-known writer based upon observations of soaring gulls, in which he obtained from his measurements of angles and speeds an angle of incidence which called for an upward lift of nearly three pounds upon a two-pound bird. It was his idea that the excess of lift was expended in raising the bird above its original level. This, however, is scarcely a satisfactory explanation of how a lift of three pounds could be applied to a two-pound bird in contradiction of the law that action and reaction are always equal. It would be more reasonable to assume that the excessive lift never existed, but that the upward motion of the bird kept the angle of incidence (Fig. 3) reduced to a point where the lift was just equal to the bird's weight all of the time.

If students of aeronautical problems will constantly bear in mind that (1) area of surface; (2) weight or lift; (3) relative speed are the only factors concerned in determining the angle of incidence, many errors will be detected and much trouble saved. It is clear that a bird, instead of possessing full control of its angle of incidence (as writers sometimes assume), is, in fact, almost powerless to change it. The bird is really itself controlled by a kind of automatic governor, for a gust of wind which tends to increase the lift is balked by the fact that the weight of the bird is not sufficient to furnish the required reaction, and the bird must either float back horizontally with a speed equal to the increase in the velocity of the wind, or it will involuntarily be raised at a speed sufficient to keep its angle of incidence at a point where the increased lifting pressure naturally due to the increased speed will be exactly counterbalanced. Nevertheless the bird can, to a limited extent, affect its area, its weight, and its speed, and thus indirectly its angle of incidence also. Its area may be reduced (and its angle increased) by partly folding its wings, but as, in actual practice, a folding of the wings always accompanies an increase of relative velocity (which produces a decrease in angle), the real effect is to preserve the original angle instead of changing it. The apparent weight may be momentarily increased by a sudden curve in the direction of motion, in which case the momentum of its body acts to produce a centrifugal force which increases the downward pressure on its wings, and thus requires an increase in the angle of incidence to furnish the required extra support. Speed may be controlled by increasing or decreasing the elevation of the bird or its rate of fall. But none of these changes in speed, area or weight, quickly and permanently affect its angle of incidence. The bird can at will vary its angle with the horizon, even to the extent of three hundred and sixty degrees in less than a second, as when it turns a complete somersault in the air; but its angle of incidence probably does not vary as much as one-twentieth of that amount in the same case. It is very important to distinguish carefully between the angle of incidence, and the angle with the horizon, as the latter has nothing at all *per se* to do with the former. By keeping the distinction carefully in mind, the student will quickly obtain new ideas of the correct

explanation of the action of the Penand tail used by Lilienthal, Pilcher, and Chanute; and correct the sequence of cause and effect in many explanations of phenomena which occur in aeronautical writings.

Since the formulation of a principle into a rule often serves to fix it more prominently in the mind, the writer ventures to offer the following:—

Rule.—The angle of incidence is fixed by area, weight, and speed alone. It varies directly as the weight, and inversely as the area and speed, though not in exact ratio.

The International Balloon Ascents.

April 19th.

The following countries joined in the experiments—Austria, France, Germany, and Russia. The number of balloons sent up were nineteen, of which six were manned. As "Nature" points out in a note upon these International ascents, the results of the ascents with manned balloons from Berlin and Vienna had a very remarkable similitude. At Berlin the temperature on starting was 5°·6 C. and −25°·5 at an altitude of 5,500 metres; at Vienna it was 5°·0 at starting and −25° at 5,260 metres. The greatest height attained by the ballons sondes was 11,848 metres at Chalais Mendon, where the temperature was −52°·8 C., the next highest record was 11,000 metres at Trappes where the temperature was −62°, and the third was 10,500 metres at Strassburg where the temperature was −54°.

May 14th.

Eighteen balloons were sent up from Berlin, Strassburg, Trappes, Chalais-Mendon and other places. The most interesting result was that of the one sent up from Chalais-Mendon and which has been noted by "Nature." The temperature at starting was 15°·8. Zero was recorded at 3,661 m., −50° at 9,640 m., and the lowest temperature −55°·8 at 11,025 m. An invasion of temperature afterwards occurred, and at the highest altitude, 15,414 metres, the thermometer registered −32°·2.

The absence of ascents from this country is to be regretted, but it may be pointed out that the short period of time during which ballons sondes have been sent up from this country has shown that our insular position is somewhat unfavourable to this method of investigation. A balloon and its recording instruments has already fallen in the sea, though the instruments were recovered. Hence the necessity of having some means of control over the movements of balloons which carry expensive self-recording instruments, when sent up from an island like Great Britain, is apparent. Experimenters are, however, at work, endeavouring to meet the contingency. One attempt is the Meteoparachute, which was brought before the notice of the Society at its last meeting and fully described above. Another, and still later device, is the one being developed by Mr. Patrick Alexander, and which depends upon the action of Hertzian waves for the control of flying machines carrying the instruments. On this interesting new departure Mr. Patrick Alexander will read a paper at the next meeting on the 15th which he promises to illustrate with working models.

NOTES.

Aeronautical Exhibits at the Crystal Palace Exhibition.—One of the exhibits attracting most attention and interest at the Naval and Military Exhibition now being held at the Crystal Palace, is undoubtedly the Ladysmith balloon. We have before had occasion to call the attention of the public, in the pages of this journal, to the excellent and unique features of our British war balloon equipment, which is, without an exaggeration, the finest in the world. We have also spoken of the satisfactory work accomplished by the balloons during the South African war. In besieged Ladysmith their utility was most specially valued. There, the observer in the car located the enemy's guns, and directed the enemy's fire with an unerring precision. As will be seen in the announcements of the forthcoming general meeting of the Aeronautical Society, a series of views will be presented, showing the operations of the war balloons in different parts of the campaign. Another interesting exhibit at the Crystal Palace is the historic balloon "La Volta," in which M. Janssen, the Parisian astronomer, made his escape during the Siege of Paris. Perhaps this exhibit may be of greater interest to the public on account of the publication

of the story of M. Janssen's escape in the biographical sketch of M. Janssen's life, appearing in the January number of this journal. The management of the Crystal Palace has also announced practical demonstrations of Major Baden-Powell's war kites in the summer programme.

Dr. C. Zimmerman's "Cycala" Flying Machine.—Dr. C. Zimmerman has sent a preliminary communication to the Aeronautical Society respecting his new flying machine. "I am endeavouring to push to a successful issue my idea of a flying machine. I have coined a word meaning literally 'A Wing Wheel,' derived from the Greek 'Kyklos,' a circle, and Latin 'Cela,' a wing. My location is on a ridge of hills about 1,000 feet above sea level and 500 feet above the city of Frederick, which is 5 miles distant. I am laying out a circular track about 12 feet wide and 30 feet in diameter, so as to get a continuous run for my machine, as I expect to reach a speed anywhere from 20 to 60 miles an hour."

Remarkable Kite Flight.—Mr. A. Lawrence Rotch has communicated the news of a very remarkable flight of a pair of kites in the summer of 1900 from the Royal Aeronautical Observatory near Berlin. Five kites which had lifted self-recording meteorological instruments to a height of two and a half miles, broke the wire that confined them to the ground, and the two upper kites dragged it across the country for nearly a hundred miles before they were finally checked, the trailing wire, two miles in length, furnishing a sufficient resistance to keep the kites flying through the night. It has often been pointed out that a kite is a flying machine, therefore it is worthy of note that a flying machine has actually travelled for a hundred miles, and an accident has accomplished what premeditated efforts have failed to bring about.

Dr. Barton's Flying Machine.—Dr. Francis Alexander Barton has devised a flying machine which is a combination of the balloon and aeroplane principle. Between the balloon and car is fixed a horizontal aeroplane, which, when put in operation, causes the machine either to ascend or descend or travel straight at any altitude. At the rear of the machine is arranged a vertical aeroplane for steering to the right and left. As the "Daily Express" points out, the great difficulty that has hitherto been experienced by airship inventors is that of circumventing the disastrous results following the moving of the centre of gravity. This Dr. Barton claims to overcome in the following manner: Two half-filled water tanks are arranged at each end of the car, and when one end of the machine becomes heavier than the other, the water is automatically pumped from one machine to the other.

M. Louis Godard's Projected Balloon Voyage Across the Atlantic.—Sea trips are coming much into favour with aeronauts. The most daring project on hand is the one to be undertaken by M. Louis Godard, who will attempt a journey over the Atlantic. The start is to be made from New York. It has been calculated that the journey will occupy four days. The cost of the enterprise is estimated at £8,000.

The principal novel feature of the huge balloon in which the journey will be made is the attachment of a number of smaller balloons round the equator. These smaller balloons will act as reservoirs of gas. When wanted, the reserve supply of gas will be transmitted from the smaller balloons into the larger one by means of a system of ropes and valves worked from the car. It is claimed that by such a provision of gas the balloons can be kept in the air for sixty days, and travel 15,000 miles without alighting to renew its provision of gas.

The Balloon Railway.—A very novel form of mountain railway has been devised by two Styrian engineers, Herven Balderauer and Brockebusch. The system consists of a captive balloon attached to a single suspended rail to be fixed on to the side of such precipitous mountains as no other form of railway could climb. The balloon is about twelve yards above the rail to which it is secured by a wire cable, and it is worked up and down the side of the mountain by the engineer.

When ascending the lifting power is solely derived from the hydrogen within the balloon. For the descent a reservoir in the balloon is filled with water, which acts as ballast. There is a circular can underneath the balloon through the centre of which the cable passes. It is claimed that during experiments with the apparatus no accident or hitch has occurred. But those who are acquainted with the working of captive balloons will probably suggest that the system will have to be kept for calm weather.

New Air-Ship on Lake Constance.—Lake Constance has been again the scene for a trial of a new air-ship. This is the device of Mr. Henry Suter of Zurich. The ship is propelled by two large air-fans worked on the cycle principle by the Aeronaut, who is seated in a saddle in the cage from which he also directs the steering apparatus. Below the cage are two cylinders, tapering to a point at the ends. These act like pontoons and enable the machine to float on the water. The first trial, however, was not very successful, the machine being driven on to the shore by the wind amongst trees from which it had to be released.

Foreign Aeronautical Periodicals.

On this list a selection of some of the most notable articles is given.

L'AERONAUTE (Paris).

April, 1901.—Notice sur la Poste Aérienne par Pigeons Voyagers pendant le Siège de Paris, 1870-71, par M. L. Van Roosebecke.—Les Aérostiers Militaires pendant le Campagne d'Egypt.—Mémoire présenté au Congrès International d'Aéronautique, par le Baron Marc de Villiers du Tenage.

May.—Communiqué de la Société au Sujet du Brevet d'Aéronaute-Gazogène à Ammoniaque au Chlorine de Calcium, note de M. Josselin.—Ballon plat de M. Georg Lindner de Karlsruhe.

L'AEROPHILE (Paris).

April, 1901.—Portraits d'Aéronautes Contemporains: Alberto Santos Dumont (Emmanuel Aîmé); Les Ballons Dirigeables Santos-Dumont; La Traversée de la Méditerranée en Ballon (Henry de la Vaulx).

May.—Portraits d'Aéronautes Contemporains: Albert Tissandier (Henry de Giaffigny); L'Air Libre (Georges Besançon); Au Sujet des Traversées Aériennes au long Cours (Henri Tapissier); 3,000 Kilomètres en Ballon (Maurice Farman); Perfectionnements Apportés aux Aérostats Dirigeables (Baldensperger).

ILLUSTRIRTE AERONAUTISCHE MITHEILUNGEN (Strassburg).

April, 1901.—Zeppelins Zweiter und Dritter Aufstieg, von Oberleutnant Dietel.—Die Hohen, Berg und Luftschiffer-Krankheit, von Dr. Med Carl Scherk.—Weitere Messungen de Electrischen Zerstrenung im Freiballon, von Prof Dr. Hermann Ebort.—Drachenballon Mit Anemometer und Registrirapparat, von Eugen Riedinger.—Meteorologische Zusammenstellungen von Internationalen Ballonfahrten, von Prof. Dr. Hergesell.—Werth und Bedeutung der Radflieger fur die Luftschiffart, von Prof. Georg Wellner.

Notable Articles.

1901.

April 27. *Daily Express.*—"A New War Balloon."
Sun.—"Sun Balloons—A Fleet of Sky Searchers."

May 1. *Daily Express.*—"Patriotic Ballooning."
Daily Mail.—"If London were Besieged."

2. *Sun.*—"Sun Balloons—Four Successful Trips."

3. *Military Mail.*—"Aeronautics up to Date—A War Balloon and a Flying Machine."
Daily Chronicle.—"Experiments in the Air."

4. *Illustrated Mail.*—"A Balloon Farm."

5. *Morning Leader.*—"German Manœuvres."

31. *English Mechanic.*—"Hofman's Flying Machine."

June 1. *Sturey's Illustrated.*—"Ballooning Across the Atlantic."

6. *Standard.*—"A Balloonist's Adventures."
Glasgow Daily Mail.—"Flying Machine Trials at Dumbarton."

Applications for Patents.

(April, May, and June.)

Compiled by Messrs. BROMHEAD & Co., 33, Cannon Street, London, E.C.

6,781. April 1. WILLIAM EDWIN IRISH. **Improvements in Air-Ships.**

7,963. April 18. EDWARD MOTE. **The "Moteor" Aerial Machine.**

7,990. April 18. ROBERT HENRY BATTERSBY. **Improvements in Kites.**

8,320. April 23. VICTOR TAREZAL, EDMOND ROHEIM, and JOSEPH SIMKO. **Improvements in Kites.**

8,369. May 4. RUDOLF COUNT WESTPHALEN. **Improvements in Propulsion of Vessels.**

9,816. May 11. ALEXANDER LEWENTALL **Improvements in Balloons.**

9,886. May 13. SIR WILLIAM EDWARD JOSEPH VAVASOUR. **Improvements in Water and Air Propellers.**

9,977. May 14. JOHN WILLIAM DUNN. **Improved Method of Propelling Vessels.**

10,589. May 22. JOHN GARDNER. **A Method for Controlling and Operating Torpedoes.**

10,816. May 25. THADDEUS HYATT. **Improvements in Machines and their Mechanism for Navigating the Atmosphere upon a New Principle, and in Means and Methods connected therewith, the Aerostat, as a Toy, being included as a part of the Invention.**

11,633. June 7. CHARLES ARTHUR BARRETT (Mellin's Food, Ltd.). **Combined Balloon and Parachute for Raising and Dropping Printed Advertising Circulars.**

11,948. June 11. FERDINAND LOMBARD **Improvements in Balloons.**